Just In Time Quick Check

Standard of Learning (SOL) A.7d

Strand: Functions

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The student will investigate and analyze linear and quadratic function families and their characteristics both algebraically and graphically, including intercepts.

Grade Level Skills:

- Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically.
- Use the *x*-intercepts from the graphical representation of a quadratic function to determine and confirm its factors.
- Investigate and analyze characteristics and multiple representations of functions with a graphing utility.

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Just in Time Quick Check Teacher Notes

Supporting Resources:

- VDOE Mathematics Instructional Plans (MIPS)
  - A.7bcd - Functions 2: Exploring Quadratic Functions (Word) / PDF Version
  - A.7cd - Quadratic Connections (Word) / PDF Version
  - A.7cd - Solving Linear Equations Using Functions with Desmos (Word) / PDF Version
- VDOE Algebra Readiness Formative Assessments
  - A.7c,d (Word) / PDF
- VDOE Word Wall Cards: Algebra I (Word) | (PDF)
  - x-Intercepts
  - Parent Functions - Linear, Quadratic
- VDOE Rich Mathematical Tasks: The Soccer Competition
  - A.7 The Soccer Competition Task Template (Word) / PDF Version
- Desmos Activities
  - Transforming Lines
  - Two Truths and a Lie: Quadratics
  - What's my Transformation?
  - Polygraph: Parabolas, Polygraph: Parabolas Part 2
  - Polygraph: Quadratics
  - Will It Hit the Hoop?

Supporting and Prerequisite SOL: A.1b, A.4a, A.6c, 8.16b, 8.16d, 8.17, 7.10c, 7.12

SOL A.7d - Just in Time Quick Check

1. Circle all of the following functions that have an *x*-intercept of 3.

   $f(x) = x^2 - 2x + 3$

   $g(x) = 2x - 6$

   $h(x) = x^2 - 9$

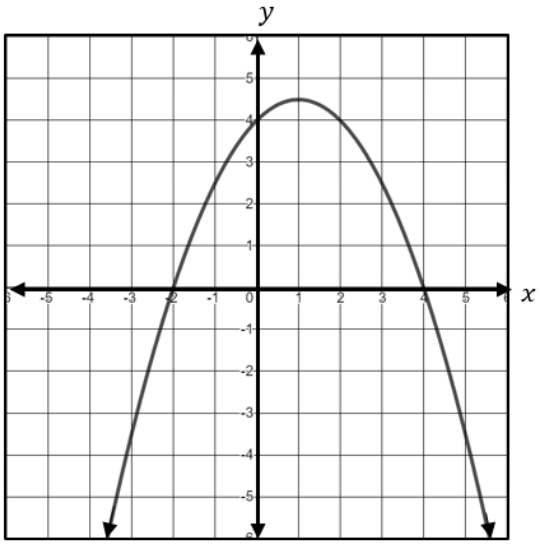
   $p(x) = -\frac{1}{2}x + 3$

   $q(x) = -3x^2 + 10x - 3$

2. Let $g(x) = -\frac{2}{3}x + 5$ and $h(x) = \frac{4}{5}x + k$. For which value of k will the *x*-intercept of $g(x)$ be equivalent to the *x*-intercept of $h(x)$?

3. Write the x- and y-intercept of the function $f(x) = 3x - 4$ each as an ordered pair.

4. Circle the *y*-intercept of the function shown on the graph.



5. Which of the following functions have exactly one x-intercept?

   $f(x) = 4x(x - 5)$

   $g(x) = x^2 - 6x + 9$

   $h(x) = 2x^2 + 4x + 3$

   $j(x) = -3(x + 1)$

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Common Errors/Misconceptions and their Possible Indications

1. Circle all of the following functions that have an *x*-intercept of 3.

   $f(x) = x^2 - 2x + 3$

   $g(x) = 2x - 6$

   $h(x) = x^2 - 9$

   $p(x) = -\frac{1}{2}x + 3$

   $q(x) = -3x^2 + 10x - 3$

   A common error a student may make is to select the functions with a y-intercept of 3, such as f(x) and p(x). This may indicate that a student has difficulty differentiating between an x-intercept and y-intercept using an algebraic approach. A strategy that might be useful is to have a student represent the functions visually and determine which functions have an x-intercept of 3 then make the connection algebraically. Desmos is a powerful tool that can be used to show connections between algebraic forms, graphs, and intercepts.

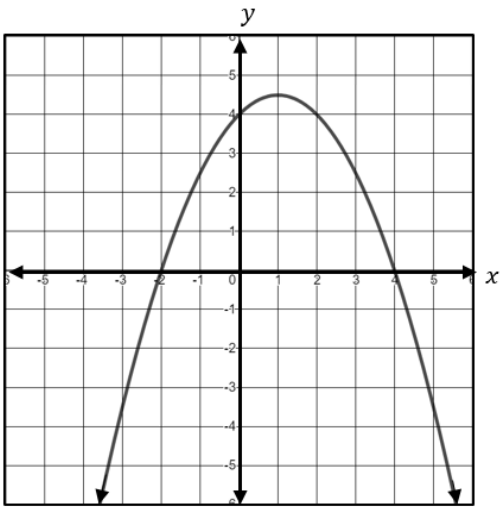
2. Let $g(x) = -\frac{2}{3}x + 5$ and $h(x) = \frac{4}{5}x + k$. For which value of k will the *x*-intercept of $g(x)$ be equivalent to the *x*-intercept of $h(x)$?

   A common error that a student may make is to say that $k = 7.5$, which is the x-intercept of $g(x)$. This indicates the student would benefit from additional practice in comparing functions and working with constant variable terms. A strategy that could be used is for the students to experiment with the slider feature in Desmos to demonstrate what happens to the graph and equation of $h(x)$ as k changes in value.

3. Write the x- and y-intercept of the function $f(x) = 3x - 4$ each as an ordered pair.

   A common error a student may make is to write the x-intercept as (0, $\frac{4}{3}$) or the y-intercept as (-4, 0). This may indicate a misunderstanding of representing x- and y-intercepts as ordered pairs. A strategy that might be helpful for students is to verify the intercepts using a graphing utility such as Desmos. In addition, a student might find helpful to use the table feature in Desmos to verify intercepts.

4. Circle the y-intercept of the function shown on the graph.



A common error a student may make is to circle both the x- and y-intercepts or to circle only the x-intercepts. This may indicate that a student has difficulty distinguishing between x- and y-intercepts and a misunderstanding between intercepts and solutions of a function. A strategy that might be helpful for students is to represent the x- and y-intercepts as a set of ordered pairs or as a table to show the similarities and differences between the coordinates.

5. Which of the following functions have exactly one x-intercept?

$f(x) = 4x(x - 5)$

$g(x) = x^2 - 6x + 9$

$h(x) = 2x^2 + 4x + 3$

$j(x) = -3(x + 1)$

A common error a student may make is to select f(x) as having only one x-intercept because it is written in factored form and appears to have one binomial factor. This may indicate that a student does not recognize that the GCF of 4x is also a factor of the function and constitutes a unique x-intercept. A strategy that might be helpful for students is to verify the intercepts using a graphing utility such as Desmos. In addition, a student might find helpful to use the table feature in Desmos to verify the x-intercepts a function.